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A CASE OF GLAUCOMA ILLUSTRATED WITH MICRO-PHOTOGRAPHS.

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February 12, 1885, Mr. B. P., æt. 74, consulted me for a disease of the right eye, of three years standing. There was entire loss of vision in this eye, and a mature cataract, dilated pupil and enlaged superficial bloodvessels, tension=+2, and severe, and deep-seated pain in it. The left eye was painful, and more so at intervals, and then, vision, at all times impaired, was more defective. This eye presented a posterior polar cataract. I could not make out the details of the fundus in this or the right eye. Believing the right eye was glaucomatous, and the left in a state of sympathetic inflammation, I advised enucleation of the right eye as a measure of safety to the left, which was done the same day, under cocaine. The latter did not prevent the pain, although there was but little bleeding. The conjunctiva was so softened that the fixation forceps would not hold. The eye-ball was placed in Müller's fluid for six weeks, and subsequently bleached in a solution of hydrate of chloral, 20 grains to the ounce of distilled water. It was then frozen and divided

longitudinally from corneal apex to optic nerve, avoiding the latter by cutting about 3 mm. above it. A photograph was taken of one of the hemispheres, and after *the half* containing the optic nerve was cut off transversely to the long axis of the eye, a ground-view micro-photograph was taken of *it* in the fresh state, as in Fig. I. This last segment was divided longitudinally through the optic nerve, its sheaths, the papilla, retina, choroid and sclerotic, and this section also was photographed in the fresh state, and the result is shown in Fig. II. The other undivided

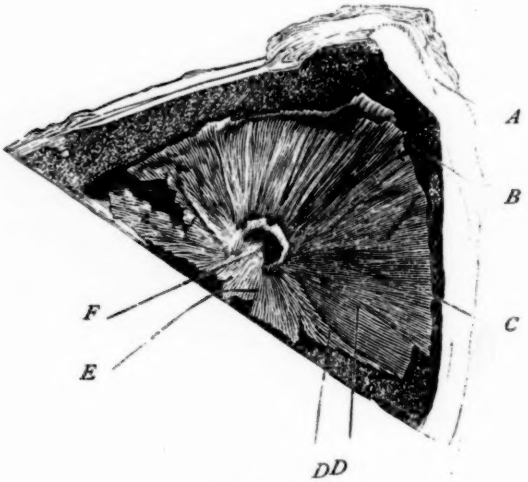

FIG. 1.

A. Sclerotic. *B.* Choroid. *C.* Retina. *DD.* Retinal vessels. *F.* Papilla. *E.* Nerve fibres.

hemisphere was placed in celloidin until saturated and then allowed to solidify in a 70 per cent solution, in water, of absolute alcohol. It was then mounted in paraffine in a microtome and thin slices obtained at various depths of the hemisphere. Fig. III represents one of these passing through the horizontal diameter of the cornea, lens, sclerotic, etc. These several photographs are about six to eight times magnified.

Referring to Fig. I, the outer circle is the sclerotic; that just within, the choroid, and further in is shown the retina. The optic papilla is seen deformed by exudates, and its margins covering the disk-bloodvessels, which latter further out ramify in an indistinct manner throughout the section of the retina, being almost hidden by inflammatory effusion and proliferation. At the lower border of the retina are seen nerve fibers. A section of the choroid and retina, perpendicular to their plane, shows under the microscope, the choroid, at points, adherent to the retina; that the rods or cones can scarcely be made out, but a few of these, detached and deformed, are seen in the field of the instru-

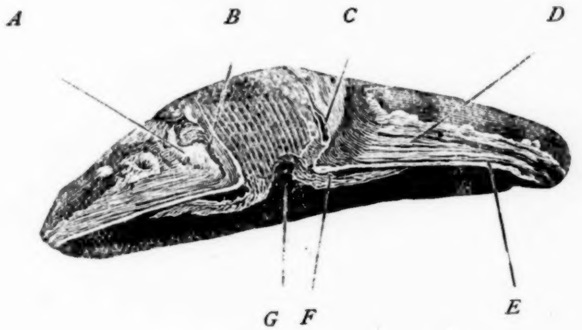

FIG. 2.

A. Arachnoidal sheath and dural sheath. *B.* Pial sheath. *C.* Subarachnoidal space. *D.* Sclerotic. *E.* Choroid. *F.* Retina. *G.* Papilla.

ment. The several layers of the retina cannot be defined, but a number of deformed "granular" and "ganglion" cells may be seen in the field, as well as distorted hexagonal pigment cells, the latter from the choroid. Pigment cells are diffused throughout the retina, and also granular matter. Nerve fibres can be observed indistinctly on the inner side of this section of the retina and fragments of its internal limiting membrane. Occasionally vertical fibers can be observed. The details of the choroid cannot be made out satisfactorily. All these states serve to complete the evidences of inflammation and its sequelæ in these membranes.

Fig. II represents a section of the optic nerve and its sheaths, the papilla, choroid and retina. The dural and arachnoidal sheaths are blended. The pial sheath and the subarachnoidal space of

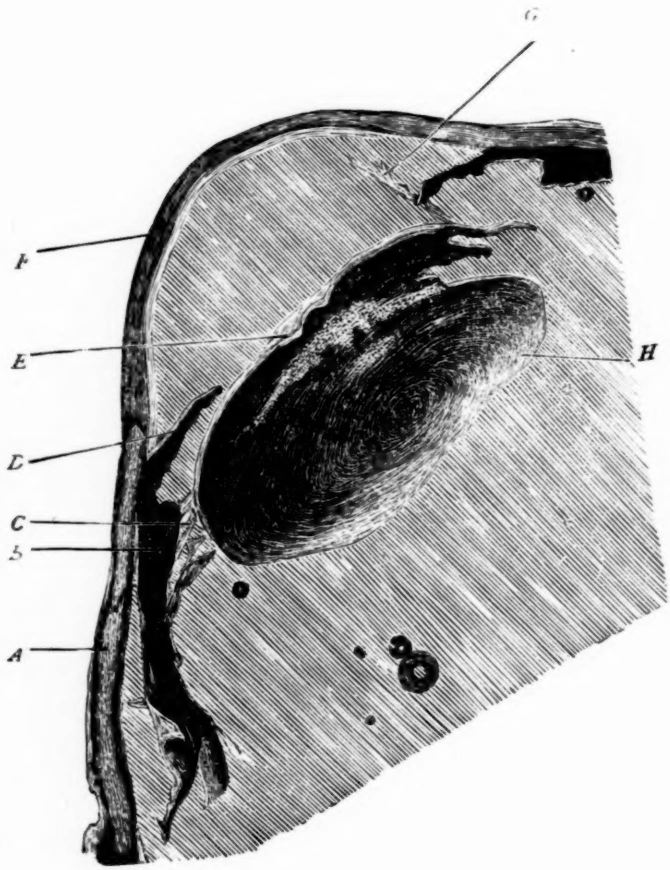

Fig. 3.

A. Sclerotic. *B*. Ciliary body. *C*. Suspensory ligament. *D*. Iris. *E*. Capsule of lens. *F*. Cornea. *G*. Portion of suspensory ligament detached. *H*. Lens.

the optic nerve investments are seen, as well as the optic nerve and its fibers, and also the cribriform fascia faintly; but the central vessels of the optic nerve are not seen. The sclerotic, choroid and retina are seen, and the latter is separated from the choroid anterior to the papilla.

The vitreous body, under the microscope, is shown to be diseased throughout, and at points this instrument was not necessary to detect its lesions. Thus there was seen pigment, granular matter, portions of retinal fibers and of the "internal limiting" membrane of the retina, a few deformed "granular" and "ganglion" cells from the retina, and also blood corpuscles, and patches of blood due to choroidal hæmorrhage.

FIG III represents an anterior section of the eye. The choroid is separated on both sides and along the outer side of each ciliary body up to the region of Schlemm's canal, and a portion of the split choroid remains attached to the sclerotic. The vessels of the choroid are enlarged as well as those of the ciliary body. In the latter, the longitudinal muscle fibres are indistinct, and *it* is somewhat atrophied owing to cyclitis. On the left side, the portion of the suspensory ligament, attached normally to the outer margin of the posterior capsule, has floated forward between the lens and ciliary body, while the anterior segment of this ligament remains attached to the anterior capsule. Nearly opposite the head of the left ciliary process can be seen, under the microscope, a group of deformed hexagonal cells which have been separated from the choroid, and having floated forward, rest upon the margin of the lens. This, and the fact that on this, as well as on the opposite side of the lens, a part of the posterior capsule has been carried forward, on the right side even into the anterior chamber; and also that the iris is turned forward on each side, and a space is seen between the margin of the lens and the head of the ciliary body, greater than normal, leads to the conclusion that the current, in this eye, at some stage of the disease, was from behind forward. On the right side, the suspensory ligament leading to the posterior capsule at the margin, is separated from the lens, but is attached to the ciliary body, and a portion of the lens at its right margin is split, and the anterior segment is carried with the anterior cap-

sule and turned forward. At the inner extremity of the partially atrophied and irregularly defined iris, rests a portion of the anterior segment of the suspensory ligament, and at the same point is seen the extremity of a portion of the membrane of Descemet, torn off from the cornea and curved backwards, and resting upon the inner pupillary margin of the iris on this side. From near the apex of the cornea towards the left. extending to the outer margin and origin of the iris, the membrane of Descemet is still attached to the internal elastic layer, and the latter is roughened over its entire surface, and contains, as well as the internal elastic membrane, numerous pigment granules and a free deposit of granular matter. The iris is further forward on this than on the left side, and there is an open passage between the right margin of the lens and the adjacent ciliary body, permitting the intraocular fluids to pass forward freely on this side.

The anterior capsule of the lens is *in situ*, but thickened and slightly separated from the lens, but the posterior capsule is not in normal position. On the left of the lens is quite a large opening in its structure, and a larger one on its right, which extends to the center of its anterior region. The lens fibres can be made out. Throughout the lens substance, can be seen a quite free deposit of pigment granules. The anterior chamber is large and the pupil widely dilated, and at the base of the iris, its outer surface rests against the cornea. On the outside, towards the apex, the cornea is disintegrated, involving the epithelial and elastic layer, and the true cornea at points; and the entire external surface of this membrane is irregular and shows delicate ridges. The fibers of the true cornea are wavy instead of running parallel with the surfaces of the cornea, and often they are broken. At several points this layer is disintegrated. The canal of Schlemm is closed on both sides.

Just where the disease began in this eye is questionable; but the evidences of papillitis, retinitis, choroiditis, hyalitis, cyclitis, capsulitis, iritis, keratitis, disintegration of the lens, rupture of the suspensory ligaments and closing of the outlets of the eye, and resulting glaucoma, are apparent.

DESCRIPTION OF AN AMETROPIA MODEL FOR CLASS-DEMONSTRATION.

By GEO. M. GOULD,

OF PHILADELPHIA, PA.

THE OBJECT OF THE MODEL is to give teachers of physiology and ophthalmology ready and striking illustrations before their classes of the principles of emmetropia, hyperopia, myopia, astigmatism (all varieties), presbyopia, the interval of Sturm, etc.

THE ESSENTIAL FEATURE OF THE MODEL is the illustration by four cords of the course of four typical and correspondent rays of light traversing an emmetropic or ametropic eye. These cords are so devised that they always remain taut whatever their displacement on the cross-bars, representing the rectilinear propagation of light. The cords are large in order to be easily distinguished from a distance, the two horizontal ones covered with blue silk, and the two vertical with scarlet, thus more clearly representing their courses.

THE LUMINOUS OBJECT, whence proceed the light-rays is placed in front of the nodal point of the refractive system of the eye and is represented by cross-bars placed as far from the nodal point in front as the emmetropic focus, (the retina at zero) is behind the same. The attachments of the cords to the cross-bars are such that, sliding in grooves, by a movement of the hand the cords can be made to diverge from a point, proceed in a parallel manner, or enter the eye convergent.

THE FOCUS OF THE RAYS, after these have passed the cornea and lens is at the fovea in the center of a segment of the posterior pole of the globe ; the last is mounted on a stand movable by a screw with rack and pinion attachment. Through slots in the retina the rays pass on to the cross-bars behind, like

those in front; by slipping the cord-attachments along the grooves of the cross-bars the rays can be made to converge in

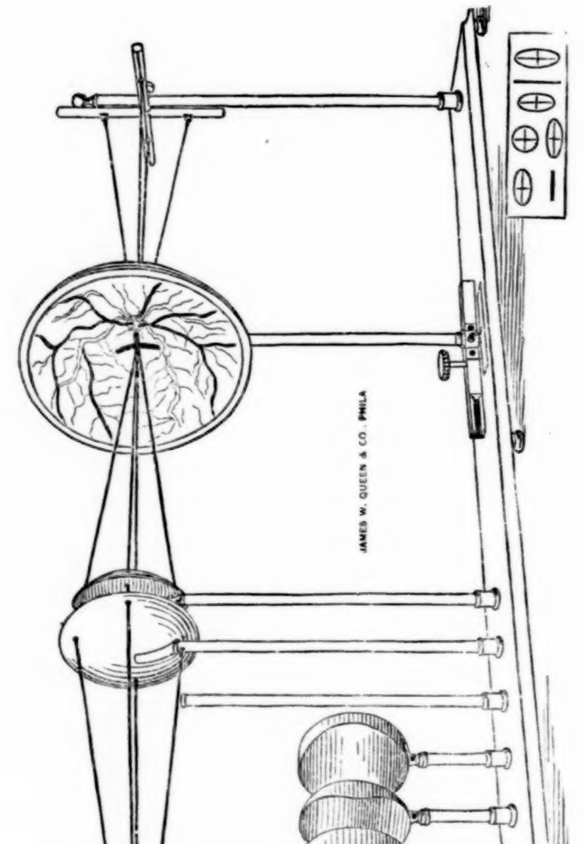

Fig. 4.

front of or behind the retina, or irregularly so, by which the conditions of hyperopia, myopia, or astigmatism are demonstrated at a glance. As by the screw the retina may at pleasure be placed at these varying foci, the illustration is thus rendered all the more convincing. This movement of the retina representing 15 dioptries, either of hyperopia or myopia is shown by the pointer upon the brass-plate at the base of the retinal stand.

ASTIGMATISM of all kinds is represented by the varying focalization of the vertical and the horizontal rays, and to make the explanation still more striking, disks of the representative astigmatic retinal images are added to the outfit.

MODELS OF LARGE CORRECTING LENSES consisting of representative convex and concave sphericals, convex and concave cylinders, and a prism, accompany the model. A stand for these is placed so that they may be mounted in front of the cornea like a spectacle-lens, or held by the handle in the hand either of teacher or student, during demonstration. A model of an astigmatic cornea is also added.

	The Normal Eye.	*The Model.*
One dioptry of hyperopia is equivalent to an axial shortening of	mm. .31	mm. 6.2
Five dioptries	1.50	30.0
Ten "	2.78	55.6
Fifteen "	3.91	78.2
One dioptry of myopia to an axial lengthening of .	.32	6.4
Five dioptries " " " " " ..	1.74	34.8
Ten " " " " " " .	3.80	76.0
Fifteen " " " " " " .	6.28	125.6

THE MODEL REPRESENTS THE RIGHT EYE, and the retina has the bowl-like shape of the posterior one-third of the eyeball. The nasal side is presented to the class. The entrance of the

optic nerve, the papilla, macula, and the ramifications of the *vasa centralia* are pictured upon the concave surface.

THE DIMENSIONS OF THE MODEL are twenty times those given of the normal eye by Graefe and Saemisch.

The model has been examined by Dr. L. Webster Fox and Prof. A. P. Brubaker, experienced teachers of ophthalmology and of physiology and pronounced by them as calculated to be of great service to teachers in giving rapid and brilliant illustrations of the principles of the refraction of the eye. The model is manufactured, and correspondence concerning it will be answered by JAS. W. QUEEN & CO.,
924 Chestnut St., Philadelphia.

A CASE OF SYMPATHETIC OPHTHALMIA THIRTY-FIVE YEARS AFTER THE INJURY—RECOVERY BY ENUCLEATION.

BY F. CORNWALL, M. D., SAN FRANCISCO, CAL.

The *pathogeny* of sympathetic ophthalmia has been a subject of so much discussion, and accurate clinical knowledge is of so much importance in helping to establish facts regarding it, that this case is deemed of sufficient importance to publish. The interesting points in the case are that it was a case of optic neuritis, and that it was evidently caused, after so long a lapse of time since the reception of the traumatism of the injured eye, by the bone-tissue in it, which irritated the optic nerve as a foreign body; the transmission in this case extending through the nerve of one eye to that of its fellow.

The history of the case is as follows:

Mr. H., a fruit grower, aged 48, presented himself with the following history and symptoms: He stated that about thirty-five years ago, while picking cherries, he fell from a tree several feet, lighting on an upturned hoe, cut his upper lid and eye-ball almost in two. The country doctor who attended him directed that a poultice be tied over the wound, and so it healed, the two cut edges of the upper lid adhering to the stump. The injured eye gave no trouble up to within a few days previous to his application to me, except that there had always been a slight tenderness at the point of adhesion between the lid and eyeball.

As previously intimated, about ten days before his application to me, he became aware that his only eye was going blind. Periods of a few hours would occur, wherein there would be a heavy cloud before him and then his vision was very imperfect. The *spells* would be more marked each day, and when he presented his vision was R. E. blind. L. E. $^{20}/_{c}$.

There was more or less pain in the sympathizing eye, but none to speak of in the stump. There was also orbital pain. My examination with the ophthalmoscope revealed distinct optic neuritis, the disk being so red and swollen that it was with difficulty the outline between it and the retina could be discerned. There was also slight haziness of the vitreous. The pupil was dilated, and the movements of the iris sluggish.

I at once enucleated the right. Upon examination of the stump there was nothing to attract one's attention, as regards a cause for the inflammation in the well eye, except that ossification had taken place, forming a complete tunic, and to its peculiar formation I attributed the trouble. The bony shell formed an opening around the optic nerve entrance, and on one side a sharp spicula of bone passed against or into the structure of the nerve. Two days after the operation vision rose to $^{20}/_{xl}$, and the pain had almost subsided.

At the present writing, over six months have elapsed and the eye has entirely recovered. The disk remained hyperæmic for two or three months, but has now become normal in its appearance.

It is my opinion that this was a case of sympathetic optic neuritis, and that the inflammation of the nerve in the sympathizing eye was caused by irritation of the nerve of the traumatized one by the sharp edges of bone. This would go to prove that the medium through which irritation is transmitted from an affected eye to its healthy fellow depends much, and may be altogether, upon the site of the original injury. From my experience with phthisical eyeballs in which ossification has taken place, I am led to the belief that this bony structure is oftener the cause of sympathetic disease than is commonly thought. The fitting of artificial eyes upon old stumps of this kind often produces irritation of the other eye, and this, I have reason to believe, most likely occurs where there is ossification.

AFTER-TREATMENT OF CATARACT OPERATIONS.

DR. S. C. AYRES, CINCINNATI.

We seem to be passing through a period of evolution in the matter of the treatment of cataract patients immediately after operation, if we may judge from the number of articles appearing in the journals on that subject. The old method of close bandaging and enforced quiet for several days is justly falling into disuse. The rigid rules once in vogue are now broken, much to the comfort of the patients who, as a rule, bear the recumbent position badly. Patients used to complain more of pain in their backs than in their eyes, and would beg to be released from confinement to the bed. I long ago learned that it was very important to comply with these reasonable requests for change of position, and would allow patients to turn on either side, or to be propped up in bed with a rest behind their backs to support them. I am more liberal now, and allow patients to be up and be dressed the second or third day after operation. It certainly seems reasonable that we should endeavor to make our patients as comfortable as possible as a first and essential condition to success.

It seems quite certain that the old-fashioned figure of 8 bandage has been productive of bad results from the restless movements of the patients. If the head should be moved from side to side, and especially if the patient should slide down in the bed, that portion of the bandage which goes behind the occiput would be drawn upon, and thus both directly and indirectly traction would be made upon the eyeball. To obviate this, I used a single strip of bandage around the head, having first covered both eyes with a piece of soft muslin or linen and placed a small quantity of absorbent cotton over each eye. This was objectionable, as it would sometimes slip off at night leaving the eyes exposed. I have for some time past adopted the following very simple and comfortable

method of dressing an eye after cataract operation. A piece of absorbent cotton large enough to fill the "hollow" of the eye, even with the rim of the frontal bone and the bridge of the nose, is placed over the closed eyelids. Over this is placed a flap cut from soft muslin or linen about two inches broad, and long enough to extend from the forehead to the lower edge of the malar bone. It may be single or double. This is held in position by a narrow strip of isinglass plaster across the forehead. The cotton absorbs any secretions from the eye and is changed twice a day. By lifting the flap and removing the cotton the condition of the lids can be inspected without any inconvenience to the patient. He does not have to lift his head to allow the bandage to be removed or readjusted. He can turn his head on the pillow at night as much as he pleases without fear of making traction on the eyeball. It is simple, comfortable and free from the dangers of the bandage, and affords the eye ample protection. I prefer to cover only the operated eye, but give strict instructions to the patient to keep both eyes closed until he is permitted to open them. I have within the past two months, among others, operated on two persons, one aged 80, and the other 82, who were treated in this way. They sat up in bed as much as they wanted to the day after the operation. They did not care to be dressed until the third day. The light in the room was modified by partly closing the shutters. They were in the hospital only six days, and went home with good results.

ON SOME OF THE OPTICAL PROPERTIES OF SPHERICAL AND CYLINDRICAL LENSES PLACED OBLIQUELY TO THE INCIDENT PENCILS OF LIGHT.

SWAN M. BURNETT, M. D., WASHINGTON, D. C.

In general text-books on optics, where the ordinary properties of optical apparatus are treated of, it is assumed that the surfaces are of limited amplitude and that the object lies on the optical axis. Otherwise it would be impossible to get general formulæ approaching to the simplicity of those now in use in determining the formation of images by reflection and refraction. And for the vast majority of uses to which optical apparatus are put, this is sufficient.

It is, however, of more than a mere scientific interest to know something of the behavior of lenses when placed obliquely to the path of the light-pencils, and where they are of the amplitude of lenses ordinarily used for spectacles.

This has been done theoretically in some of the more extensive treatises on higher optics, but, so far as I know, no experimental demonstration of the phenomena has been made with lenses in common use, except that by Pickering and Williams. [1]

These authors give tables showing the foci of lenses for every 5° when turned on their vertical axis, both for their vertical and horizontal meridians. They show that the refraction is increased by such inclination for both meridians, but much more rapidly for the horizontal. In other words, the rotation of a spherical lens increases its refraction and at the same time adds to it a cylindrical action—the lens becomes a sphero-cylinder.

Their experiments were made by observing through a small

[1] Foci of lenses placed obliquely by Prof. E. C. Pickering and Dr. Chas. H. Williams. *Proc. Amer. Acad. of Arts and Sciences.* N. S. Vol. II. 1874-75. pp. 300-307.

telescope and the lens experimented with two fine silken threads stretched in narrow slits, and placed horizontally and vertically before a gas-flame. The silken threads could be seen distinctly only when they were in the focus of the lens, and a graduated scale on which the screen holding the threads moved, showed the points at which they were then distinctly seen at each successive rotation of 5°.

The observations were made through a small aperture and the center of the lens.

While engaged recently, in investigating some other point in refraction, I also experimented with obliquely placed lenses, but in a somewhat different manner.

I used in my experiments a Snellen's phakometer, and observed the images of the small holes in the disk which serve as the source of light; as they were cast on the ground-glass screen. The disk and the screen are always at conjugate foci, and the exact focus of the lens experimented with can be read on the horizontal bar on which they move for every position of the screen. The lens was placed at equal distance from the screen and disk, and so arranged as to turn on its vertical axis, which passed through the center of a horizontal semi-circle marked at every five degrees.

The results I obtained were, in the main, the same as those of Pickering and Williams, but there were some additional phenomena not mentioned by them to which I would here call attention.

When the lens lay at right-angles to the course of the rays, the round dots of light were clearly and sharply defined when the screen was at the focus of the lens.

If, now, the lens was rotated for, say, 10°, the dots were no longer clearly outlined as round points, but became elongated *horizontally*. If the screen was then advanced toward the lens, the form of the images changed and they finally became, in a certain position of the screen, elongated *vertically*.

This, of course, showed an increased refraction in the planes parallel to the horizontal meridian of the lens, brought about by a rotation of the lens on its axis. This increase in refrac-

tion for this meridian was found to be greater, the greater the inclination of the lens, as judged by the nearer and nearer position of the screen required in order to have the vertical lines with sharp edges. It was also observed that as the lens was more and more inclined, the screen had to be approached nearer and nearer the lens in order to have the,horizontal lines with sharp edges.

All this is what was to be expected from the investigations of Pickering and Williams.

It was observed, in addition, however, that the vertical lines corresponding to the holes in the horizontal meridian near the periphery of the disk, were not sharply outlinedat the samepo-sition of the screen. As the screen was approached to the lens, the line to the *right*, (the image of the hole to the *left* of the disk) and corresponding to the side of the lens farthest from the screen was the first to become sharply defined. The lines at the center and to the left of the screen became distinct only when the screen was brought still closer to the lens, and then the line to the right was thrown out of focus.

This shows conclusively that *the focal plane of an obliquely placed lens is not at right-angles to the optical axis, but inclined, and the inclination is in a direction opposite to the inclination of the lens.*

In table I. is given the refraction of a lens of 1 D. for an inclination of every five degrees up to 45°. Beyond this the dispersion of light was so great as to make accurate focussing impossible for the horizontal planes.

TABLE I.

INCLINATION OF LENS.	SPHERICAL REFRACTION.	f	f1
5°	slight	slight.	slight.
10°	1.1	1..0	1.25
15°	1.2	1.30	1.5
20°	1.25	1.57	1.75
25°	1.30	1.7	2.2
30°	1.4	2.6	3.
35°	1.5	3.4	4.
40°	1.6	3.6	5.1
45°	1.75	5.2	6.8

The first column shows the inclination of the lens in degrees; the second the focus of the horizontal lines, representing the

spherical refraction; f. the focus of the extreme right vertical line; f' the focus of the extreme left vertical line. The refraction is noted in dioptrics and decimals.

The experiments were repeated with a large number of lenses from the trial-case. The same general principles lying at the basis of all, it is unnecessary to give them in detail, but it is interesting to note, as would be expected, that the difference in the foci of the two sides became more noticeable as the lenses were stronger. In table II. are given the foci for a lens of 8 D. to the right (*f.*) center (*fo*) and left (f_1) of the screen.

TABLE II.

INCLINATION OF LENS.	SPHERICAL REFRACTION	f	f0	f'
10°	8 1	8 3	8.4	8.5
20°	8 2	8.7	9.	9.5
30°	8.5	10	10.5	11.3
40°	9.	13 5	15.	17.

It should be mentioned that these foci make no pretensions to an accuracy within a tenth of a dioptry, and in the greater inclinations hardly that could be claimed, on account of the large number of diffusive images and general indistinctness of the lines.

It was further observed that the horizontal lines, produced by refraction in the vertical planes of the lens, did not become equally distinct throughout their entire length at a fixed position of the screen. The end to the right, corresponding to the more distant side of the lens, and the left side of the disk, become clearly outlined before the other.

These observations were verified in a number of ways. If, for example, when the 1 D. was rotated at an angle of 30° and the right vertical line was in focus (*f.*) a—0.5 was held close before the lens the left line was brought out clearly, and the right became blurred. When it was at 40° and the screen was in the position of *f.*, a — 1.5 brought out the left vertical line (f_1) distinctly, and blurred *f.*; and when it was at f_1, a + 1.5 blurred that line and made *f.* clear.

Verification by neutralization was also made when test-types were obscured through obliquely placed lenses. This was not

so satisfactory with the weaker lenses and slighter inclinations, but was quite plain for the stronger lenses and greater inclinations. When + 4 D., for example, is rotated to 30°, a single line of Snellen's test-types cannot be seen distinctly throughout its entire length, when — 4. and any one cylinder is placed close behind the lens.

The letters to the left of the line come out clearly with —0.75^{cy} the center with —1.5^{cy} and those to the right with —1.75^{cy} axes vertical. With no one of these cylinders alone can the whole of the line be seen with equal clearness when the observing eye is on the optical axis.

The general truth of the proposition can also be verified by a simple experiment with an ordinary magnifying lens. If a lens of one or two inches focus is held obliquely before a printed word, it will be observed that when the letters at one end of the word are in focus and seen clearly, those at the other end are indistinct.

It has been, for a long time, a matter of observation by some, that in certain cases, particularly after cataract-extractions, a better optical effect was obtained by tilting the spectacle lens than could be had by any combination of spherical and cylindrical lenses. The facts brought out in these experiments will, I believe, help to explain this clinical observation which has not hitherto been very clearly understood.

It has been determined by keratometric measurements [1] that after extraction of cataract the form of the cornea is very much altered, and even after cicatrization has taken place, there remains a certain, and in some cases a very large, amount of regular astigmatism that can be corrected by cylinders. But in addition to this, there sometimes remains as a result of cicatrization an unequal curvature in the vertical meridian. This meridian no longer represents the segment of a circle, whose center is common with that of the other meridians, but a curve either with varying radii or with a center off the optical axis. Either one of these conditions would produce a focal plane for that meridian lying obliquely to the optical

axis, which could be neutralized by a lens inclined at the proper angle. And it is hardly claiming too much to assert that now having a means in our hands in the ophthalmometer of Javal and Schiötz by which we can measure the refraction at different points of the same meridian, we may be able to discover the exact inclination of a given lens which is necessary to neutralize this irregular astigmatism, and have it permanently mounted; or, a formula might be obtained for grinding a lens having the optical equivalent of such a tilted lens. The use of such a lens has already been proposed by Dr. O. Purtscher, in *Knapp's Archives* XV. p. 264. 1886.

Experiments were also made with

OBLIQUELY PLACED CYLINDERS

and with exactly the same results as regards the refracting meridian as with spherical lenses; that is there was an inclination of the focal plane and the figures for f, fo and f_1, were the same as for sphericals of the same number.

Dr. G. Hay, of Boston, was the first, I believe; to call attention to the increase in the power of a cylinder by a rotation on its axis.[2] This fact was called in question by Sous,[3] who contends and claims to demonstrate that the focus of a rotated cylinder is lengthened

My experiments confirm fully the statements of Hay, and we are forced to conclude that Sous has constructed his formulæ on incorrect data.

The problem is not so simple as Sous seems to think it, and for lenses of large aperture requires a long and tedious discussion, and those who wish to enter more fully into the mathematics involved, I would refer them to Pickering and Williams' paper, (l. c.)

[1] See among others, papers by Laqueur *Graefe's Archiv* XXX, 1 pp. 99-134., and myself, *Knapp's Archives*, Vol. XIV. pp. 169-176.

[2] Trans. Amer. Oph. Soc. 1875. p. 319.

[3] Traité d' optique. by G. Sous. Paris, 1881. p. 463.

A FURTHER REPORT OF EXTRACTIONS OF SENILE CATARACT.

BY A. R. BAKER, M. D., CLEVELAND, OHIO.

In the January number, 1885, of the AMERICAN JOURNAL OF OPHTHALMOLOGY, I reported twenty-seven consecutive cases of senile cataract extraction. This report includes all my extractions since the previous report ending November 1, 1885.

My method of operation is briefly to wash out the conjunctival sack with a 1-5000 bichloride solution. A narrow Von Graefe knife is entered in the sclerotic one line from the cornea and two or three lines above the centre of the pupil. The point of the knife is passed to the centre of the pupil, the direction is then changed and the counter puncture made opposite the point of entrance. I endeavor to bring the knife out at the corneo-scleral margin and make a small conjunctival flap. I make a large iridectomy so as to leave the pupil key hole-shaped. I make the peripheral opening in the capsule recommended by Knapp, and leave the capsule as nearly intact as possible. The speculum is then removed and the lense is delivered by making slight pressure on the upper lid with the finger and on the lower lid with the scoop. I never touch the cornea with any instrument. I am always particular to have the incision perfectly cleansed, but am not particular about removing all the cortical substance from the eye if enclosed in the capsule where it can do no harm and is soon absorbed, I instill a drop of a 4% solution of atropia, apply a small adhesive plaster to the lids, cover with a piece of linen removed from a bichloride of mercury solution, pack with absorbent cotton, and apply a fourtailed (Moorfields) bandage. Put the patient to bed, keep him quiet and comfortable, but give him the privilege of sitting up or changing to whatever position is to

him most agreeable. If there is no pain, uneasiness, rise of temperature or other indication of trouble, I do not disturb the dressings until the morning of the third or fourth day, when I remove them, instill a drop of atropia and reapply the bandage. This is then done daily until the end of a week or ten days when a broad shade is substituted.

Cocaine was used as an anæsthetic in all cases except No. 30.

No.	*Sex.*	*Age.*	*Eye Operated.**	*Duration Since Mature.*	*Remarks.*
28	M.	65	L.* R.	One year. Immature.	Severe iritis occlusion of pupil. Perception ot light good. Six months afterward made iridotomy. V. $^{20}/_{30}$.°
29	F.	80	L.* R.	Four years. One year.	Severe iritis. Old case of granular lids. Occlusion of pupil. After second or third attempt secured a fair pupil. V. $^{20}/_{30}$.
30	M.	74	L.* R.	One year. Immature.	V. $^{20}/_{20}$.
31	M.	79	L. R.*	One year. One year.	Health poor. V. $^{20}/_{70}$.
32	F.	62	L.* R.	Two years. Four years.	Slight irritis. V. $^{20}/_{70}$.
33	F.	74	L. R.*	Three years. One year.	V. $^{20}/_{30}$.
34	M.	79	L.* R.	One year. One year.	Severe irsitis. Occlusion of pupil. Behaved very much like case 29. After several ineffectual attempts I was able to secure a fair pupil. V. $^{20}/_{200}$ not very satisfactory.
35	F.	97	L. R*.	10 years. 10 years.	V. $^{20}/_{70}$. Health good considering age.
36	F,	40	L.* R.	? No cataract forming.	V. $^{20}/_{20}$.
37	M.	60	L. R.*	Immature. Two years.	V. $^{20}/_{30}$.
38	M.	65	L. R.*	Three years. Four years.	V. $^{20}/_{20}$.
39	F.	50	L.* R.	Two months Three years.	V. $^{20}/_{30}$. Slight iritis.
40	M.	62	L R.*	Immature. Two months.	V. $^{20}/_{50}$. Slight iritis
41	M.	72	L.* R.	One month. Removed when a boy.	V. $^{20}/_{30}$.
42	M.	60	L, R.*	Immature. Three months	V. $^{20}/_{70}$.

No.	*Sex.*	*Age.*	*Eye Operated.**	*Duration Since Operation.*	*Remarks.*
43	M.	78	L. R.*	Two years.	This is same gentleman as case 11 of previous report. His vision in lef eye remained ve y good but is trou-bled with bodies floating in vitreous. V. R. eye $^{20}/_{30}$.
44	M.	46	L. R.*	Immature. Two years.	V. $^{20}/_{70}$. Slight iritis.
45	F.	55	L. R.*	One year. Two years.	V. $^{20}/_{40}$.
46	M.	70	L.* R.	Five years. Three years.	Panophthalmitis. V.=o.
47	M.	42	R.* L.	One year. Immature.	V. $^{20}/_{40}$.
48	F.	80	R.* L.	Two years. Four years.	V. $^{20}/_{30}$.
49	M.	74	L. R.*	One year. Four years.	V. $^{20}/_{30}$.
50	F.	90	R.* L.	Three years. Three years.	V. $^{20}/_{40}$.

Nine of the above cases were females and 14 males. The right eye was operated in 14 cases and the left in 9. When corrected with lenses from one to three months after operation.

3	of the above cases could read (Snellen	$^{20}/_{20}$
7	" " " " " "	$^{20}/_{30}$
3	" " " " " "	$^{20}/_{40}$
1	" " " " " "	$^{20}/_{50}$
5	" " " " " "	$^{20}/_{70}$
1	" " " " " "	o
3	occlusion of pupil, after operation.	
1	could read (Snellen)	$^{20}/_{30}$
1	" " "	$^{20}/_{100}$
1	" " "	$^{20}/_{200}$

The result of the operation in this series of cases has not been as satisfactory as in the cases reported previously. I have attributed most of the ill results to the use of cocaine as an anæsthetic. No. 27 of the previous report was the first case operated with cocaine. Results satisfactory. The second case operated with cocaine was the first of this series, No. 28. Severe iritis, attributed to the use of cocaine. The third case, No. 29, severe iritis. These two cases made me somewhat afraid of cocaine and I operated the next case, No. 30, without an anæsthetic with good results. My unfortunate experience in these two cases I attributed to the use of a large quantity of the drug. In the balance of my operations I used only one or two drops of a freshly prepared solution. This small amount has answered all practical purposes, and the results were quite satisfactory in all the cases excepting Nos. 34 and 46. No. 34, a feeble, nervous old man, very much afraid of the operation, a bad heart, or I should have given ether. It took a very large amount of cocaine to produce anæsthesia and even then the old man complained of considerable pain. Severe iritis. No. 46, an excellent case, operated at Charity Hospital. After making every preparation for the operation I found I had forgotten my cocaine, and used a solution already prepared in the hospital. This is the only case in which there was any corneal complication, and I attributed the loss of the eye to the use of the old solution ot cocaine. From my present experience with cocaine in cataract extractions I would say that, when used with proper precautions, it is better than any general anæsthetic. But with a patient easily managed the results are better when no anæsthetic is used, and in the future I shall confine its use to those cases in which formerly I should have resorted to a general anæsthetic.

Many of these cases, as in the previous report, were operated at their homes and left under the care of the family physician, and the results of the operation in seven or eight cases operated in general hospitals were not as satisfactory as those operated at home, even when the surroundings were far from being good. I am still more impressed with the truth of Dr.

Lawson's remark "that the success of cataract extractions depends upon the operation itself and not on the after treatment."

I was criticised quite severely by some of my colleagues for taking this ground in my last report, and it was with considerable pleasure I have noticed the growing sentiment of letting the patient have more freedom after cataract extractions, although I fear Dr. Chisolm and others have gone to the other extreme. A light bandage certainly excludes a portion of the light, prevents motion, is grateful to the patient, can do no harm and is in accordance with the best surgical principles.

The fifty cases may be arranged as follows according to age, including the visual result of those cases subsequent to operation for securing an artificial pupil.

Age.	*No.*	*VISUAL RESULTS.*							
		20/20	20/30	20/40	20/50	20/60	20/100	20/200	0
45-50	6	2	2	1		1			
50-60	10	4	2	1	1	2			
60-70	12	4	4	1	1	2			
70-80	14	1	5	2	1	3		1	1
80-90	6		1			3	2		
90-100	2		1			1			
	50	11	14	6	3	12	2	1	1

EDITORIAL NOTICE.

THE INTERNATIONAL CONGRESS.

The ill-health of Dr. Williams, of Cincinnati, having compelled him to resign his presidentship of the Ophthalmological Section, Dr. J. J. Chisolm, of Baltimore, has been appointed to that place, the editor of this journal accepting the secretaryship.

As the guests have been invited, and are coming in spite of all strife and dissenisons, it seems clearly our duty to do all we can in this section as well as in all the others, to make the sessions as interesting as we can possibly do. We hereby appeal to the American oculists to help in this endeavor by preparing papers for the occasion.

Those having something of value to bring before the section, and who have decided or shall decide to do so, should send an abstract of their paper *at once* to Dr. Chisolm (55 Franklin Str., Baltimore, Md.).

Our foreign readers would greatly oblige us by letting us know the names of our ophthalmological colleagues who intend to take part in the Congress, and by sending also the abstracts of their papers as soon as possible to the above named address.

PUBLISHER'S NOTICE.

The publishers of this journal find that, in view of its character and the expense incurred for illustrations and in publishing it, they are obliged to make a slight advance in its price. The latter will henceforth be $3.00, instead of $2.50, beginning with the present volume (Vol. IV.) They sincerely hope that the journal has proven of sufficient value to its subscribers to make them feel that it is worth $.300.

Very respectfully,
J. H. Chambers & Co.